A paper was also read, entitled "An Account of the Construction of a fluid refracting Telescope of eight inches aperture and eight feet nine inches in length, made for the Royal Society by George Dollond, Esq. F.R.S." By Peter Barlow, Esq. F.R.S.

The author has, in former papers read to this Society, pointed out the great variety of cases included under the general formulæ relating to the operation of fluid refracting telescopes, and stated the difficulty of selecting, independently of experiment, the particular case which was likely to produce the best result. This subject is pursued in the present paper; and the principles and calculations stated at length which the author has applied in the construction of the telescope which the Council of the Royal Society directed should be made by Mr. Dollond, under the superintendence of the author, in order to put these principles to the test of experiment, and to decide the question of the expediency of proceeding in the construction of a similar telescope of much larger dimensions. When the experimental telescope was completed, it was found that its performance agreed in every respect with the computed results, as well in focal distance as in chromatic and spherical aberration. The arrangement of the lenses was such, that the corrections are all of them made in the transmission of the light through the fluid, and by the fluid only. The author abstains from offering any remarks on the performance of this telescope, leaving it to those whom the Council of the Royal Society may appoint, to decide upon its merits. He concludes by expressing his obligations to Mr. Dollond, for the readiness with which he complied with all the suggestions of the author, and for the accuracy with which he has executed every part of the instrument.

Anniversary Meeting, Nov. 30th.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G., President, in the Chair.

The President delivered the following Address:

GENTLEMEN,

THIS is the Second Anniversary of my election to the Chair of the Royal Society, and I gladly avail myself of the opportunity which it affords me of renewing the expression of my gratitude to you for the distinguished honour conferred upon me in electing me to it, and still more for the continued kindness and support which I have received from you in the execution of the duties of my office. I can only assure you, Gentlemen, that if it be your pleasure that I should continue to fill this Chair, I shall feel an additional motive to induce me to devote my most earnest attention to the promotion of the interests of the Society, in the perfect reliance which I place upon your cooperation and assistance, and in the confident expectation which I entertain, that in case I should fail in the due and efficient discharge of any of my duties, I shall experience from you the most kind and liberal interpretation of my motives and conduct.

In making my acknowledgments to the Fellows of the Society at

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large for their uniform kindness and support, it would be injustice and ingratitude on my part were I not to return my public and especial thanks to the Vice Presidents, Treasurer, Secretaries, and the other Members of the Council—

To the Vice Presidents, as well for their general services as also for their kindness in supplying my place in this Chair, when I have unfortunately been compelled to be absent from the state of my health, or from the immediate necessity of discharging other most pressing public duties.

To the Treasurer, for his vigilant attention to the finances of the Society, and to every arrangement which may in any manner tend to promote the usefulness of the Institution, and increase the accommodation of its Members.

To the Secretaries, for their courteous discharge of their various and very laborious duties: and to the Members of the Council collectively, for their regular and punctual attendance at all the meetings to which they have been summoned, and for the zeal and readiness with which they have undertaken any labour, however considerable, which the interests of the Society might require them to perform.

The Report of the Council which will be read to you by one of your Secretaries, Dr. Roget, will make known to you various matters connected with the administration of the Society, and also the arrangements adopted for supplying the deficiencies of the Library in different departments of science, and for rendering it more generally accessible, and therefore more useful, by means of complete and well classed catalogues. I must refer you likewise to the same Report for a statement of the grounds upon which two Copley Medals have this year been adjudged, one to Mr. Faraday, and the other to Mons. Poisson. There is, however, one arrangement, admirably calculated, in my opinion, to increase the usefulness and to uphold the credit of the Royal Society, which that Report does not notice; I mean the Resolution adopted by the Council to allow no Paper to be printed in the Transactions of the Royal Society, unless a written Report of its fitness shall have been previously made by one or more Members of the Council, to whom it shall have been especially referred for examination. This Resolution has been acted upon for the greatest part of the last year, and some of those Reports of a favourable nature have been read before the Society, and printed in the Abstracts of our Proceedings. When the number of papers which come before the Society in the course of a year is considered, as well as the great diversity and occasional difficulty of the subjects which they embrace, it will be at once seen how greatly the labours and responsibility of the Members of the Council must necessarily be increased by the rigorous adoption of such a system. It is in consequence of the important influence which this plan is likely to have upon the well-being of the Society, that I am induced to enter somewhat in detail into the reasons which have led to its adoption.

It has long been the custom of many Foreign Societies, and particularly of the Academies of Science and of Medicine at Paris, to require written Reports upon every paper submitted to them,

from a Committee of their Members: as the persons who are selected for this duty are frequently veterans in their respective sciences, who have earned by their labours an European reputation, the Reports which are thus produced prove often more valuable than the original communications upon which they are founded, and the collections of them, as is well known, form a most important part of the stock of modern science. Many other advantages also have been found to result from the adoption of this practice. The decisions of men who are elevated by their character and reputation above the influence of personal feelings of rivalry or petty jealousy, possess an authority sufficient to establish at once the full importance of a discovery, to fix its relations to the existing mass of knowledge, and to define its probable effect upon the future progress of science. They thus operate as a powerful stimulus to the exertions of the genuine cultivators and lovers of science, who feel assured that their labours will be properly examined and appreciated by those who are most competent to judge of their value; whilst, at the same time, they tend to keep under the obtrusive and turbulent pretensions of those who presume to claim a rank as men of science, for which they possess no just title or qualification.

It was from a conviction that many similar advantages would result from such a system of Reports in the Royal Society, that the Members of the Council were induced to agree to its adoption; and it is to be hoped that, when a longer experience has given to such a plan a more complete organization, and has shown the practical extent to which it can be conveniently carried, it will then become a permanent law of the Council.

In order, however, to secure its full advantages, it will be necessary that the Council should, in all cases, include men eminent for their proficiency in all those branches of science which usually come, or are likely to come, under the notice of the Society. That such men may be found, I feel satisfied, both from my past experience and from my knowledge of the many distinguished persons who adorn the lists of this Society; and that such men would generally be ready to undertake the performance of a duty, requiring the occasional sacrifice both of time and labour, I cannot venture to doubt, without imputing to them a charge of indifference to the interests and the usefulness of the Royal Society, and even a want of proper sympathy with the scientific honour of their country.

I think myself justified in using such strong language, Gentlemen, because I believe the scientific character of this country to be most intimately associated with the scientific character and estimation of the Royal Society. One of the most illustrious of modern mathematicians and philosophers, himself a foreigner, has said that the Royal Society has contributed more to the progress of science than the combined labours of all other similar institutions; and though it would be unfair to interpret too literally the language of a compliment, yet it would not be very difficult to vindicate its general truth and justice.

It was this Society which fostered and encouraged the early labours

of Newton, and under its auspices was published the work which constitutes, and probably ever will constitute, the proudest monument of the genius of man: and from the period which immediately followed its foundation, the age of Wallis, and Newton, and Wren, and Hook, and Halley, and Taylor, to that of Herschel and Cavendish, and Wollaston, and Young, and Davy, its Transactions contain records of almost every important discovery in natural philosophy; of almost every experimental inquiry which has been most remarkable for its difficulty, delicacy, or importance; and of almost every original speculation which has most contributed to the advancement of science.

It becomes us therefore to guard these national archives of the progress of knowledge, with the reverence which is due to them as monuments inseparably connected with our own national honour; and to watch with our utmost care, lest any addition should be made to them, which can be considered as unworthy of the character of the stock upon which it thus becomes engrafted; and it therefore is the bounden duty of every Fellow of this Society, whether it be considered as imposed on him by the terms of the Obligation which he signed at the period of his admission as a Member, or as derived from the still higher and more comprehensive ties which bind every friend of the great institutions of his country, to maintain their efficiency and credit, and to allow no private or personal cause of jealousy or discontent, no trivial or unfounded plea of want of leisure from business, or occupations, to interfere with the devotion of his best exertions to uphold the character and promote the interests of the Royal Society.

There are some reasons which I know may, and very probably will be urged against the reasonableness of expecting that any considerable number of men of science, should be able, however willing they might otherwise be, to devote any large portion of time or labour to the service of any Society, let its claims upon them be ever so strong.

In this country, where wealth is the general measure of the social rank of families at least, if not of individuals, men of science must either possess an independent fortune, or they must pursue it, as is most generally the case, in connexion with a laborious profession; for we have few establishments which afford them support, independently of other employments; and even in those very rare cases, the provision which is made is so small, that no man of superior education can look forward to the attainment of the advantages which science and learning offer, in forming his scheme of life, unless he be prepared to make the most serious sacrifices. It is for this reason, that the learned professions, presenting as they do the most brilliant prospects of rank and wealth, generally absorb, in the progress of life, the studies and exertions of young men of the highest scientific education and promise; for, however strong may have been their attachment to the studies of their youth, and however ardent their ambition to obtain the honours of science, they soon find that such pursuits retard their professional advancement.

In other countries, however, where the learned professions are neither richly paid nor highly honoured, and where the exclusive cultivation of particular branches of literature and science presents the readiest access to the possession of competence and social rank, we find large bodies of men who have no professional engagements whatever to divert them from their literary and scientific labours, which are thus made to constitute the business of their lives. I am fully sensible of the great advantages which other countries possess in these respects above our own, and that it is quite impossible for us to command an equal concentration of attention to the advancement of particular branches of science, or to the concerns of a particular Society; still less so when it is considered, that those services must with us be afforded gratuitously, which in other countries are remunerated by the State, or are required as part of the duty of a salaried office:—we are not less called upon, however, on this account, to make the best and most efficient use of the means in our power, and the assistance which we cannot command as due from a sense of official or professional obligation, we may receive as rendered from a higher feeling of devotion to the promotion of the general interests of science, and with it of our national fame.

However much I may lament the want of establishments, in this country, for the exclusive and liberal support of men of learning and of science, and however anxiously I may look forward to the time when our Government and Legislature may take this subject into their most serious consideration, with a view to the remedy of so great an evil, yet I rejoice to observe amongst all ranks of society so zealous and so ardent a feeling in favour of the cultivation of every branch of science, of art, and of literature; so general and so deep an anxiety, in fact, that our country should advance in the front rank in the rapid march which European nations are making in knowledge and improvement.

It would be very easy for me to produce evidence of the existence of this spirit in the foundation of literary and other Societies in so many of our provincial towns, and in the active and general support which they receive; but it is sufficient for my purpose to appeal, for the complete confirmation of the truth of the opinion which I have expressed, to the noble manner in which the British Association has been supported, by the eager concurrence of the friends of science from all quarters of the kingdom: and the splendid reception which has been recently given to this Association by the University of Oxford; the judicious and well merited honours conferred upon four of its most illustrious Members*; the eager attention which was given to its proceedings by crowds of intelligent and admiring auditors, the great variety and excellence of the Reports which were there produced upon the present state and recent history of various branches of philosophy, will constitute a proud epoch in the scientific history of this country, and one which is full

* Brewster, Brown, Dalton and Faraday, on whom the degree of LL.D. was severally conferred.

of promise with respect to the future state and fortunes both of science and its cultivators.

It becomes my duty now to advert to the heavy and severe losses which the Society has sustained during the last year, including, I regret to say, many celebrated names, more particularly in our foreign list. I shall begin, however, with the mention of those names upon our home list, whose labours in the cause of literature or of science, appear to entitle them to particular notice.

Sir Everard Home, Bart., was born at Hull on the 6th of May 1756. He was the youngest son of Robert Home, a surgeon in the army, and descended from the Barons of Polwarth, the ancestors of the Earls of Marchmont in Scotland: he was educated at Westminster School, and though elected off as a scholar to Trinity College, Cambridge, in 1773, he never went there, having abandoned his prospects in college upon the invitation of the celebrated John Hunter, who had recently married his eldest sister, and who offered to superintend his education in surgery and human and comparative anatomy, and gave him the free use of his unrivalled collections. Under his auspices he continued to study for several years, availing himself at the same time of the lectures and instructions of the most eminent anatomical and medical teachers of his day. He went to the West Indies upon the medical staff in 1780, where he remained for four years; upon his return to England in 1784, he continued to assist Mr. Hunter in the arrangement and completion of his museum, and also in his various official duties until his death, which took place in 1793. Mr. Home was elected a Fellow of this Society in 1785; in 1808 he was made sergeant-surgeon to the King, and in the same year he received the Copley Medal for his various papers on Anatomy and Physiology, printed in the Philosophical Transactions. In 1812 he was created a baronet, being the first surgeon in actual practice upon whom that honour had been conferred.

In 1821 he was appointed surgeon to Chelsea Hospital, and in the following year he was elected President of the College of Surgeons. In the year 1827 he began to retire from the practice of his profession, and from most of his official employments; and he died at his residence in Chelsea College in August last, in the 77th year of his age.

Sir Everard Home was the author of 107 papers in the Transactions of this Society, a number exceeding that of any other contributor. He published Lectures upon Comparative Anatomy, in six volumes quarto; the two first in 1814, the third and fourth in 1823, and the two last in 1828. They consist chiefly of the results of his papers in the Transactions of this Society, with a republication of the splendid plates, by the permission of the Society, by which many of them were illustrated. He was also the author of several other works upon different subjects of anatomy and surgery; and he published in 1797, Memoirs of John Hunter, who had bequeathed to him all his papers.

Sir Everard Home must be considered as the successor of John Hunter, and in every way most closely connected with him. He

aided greatly in the formation of his noble collection; he was a witness of, and a sharer in, his most important investigations; he was also the depository of his literary treasures; and if we regard either the number or the nature of his anatomical or physiological researches, and the importance of his discoveries, we must be compelled to declare that he followed closely and worthily in the footsteps of his illustrious predecessor: but though he was a most diligent observer and collector of facts, and fully qualified, by his extensive knowledge of anatomy and physiology, to collate them with existing materials of those sciences, and to reduce them, as he has done in his lectures, to a regular and well-connected system, yet we should be unjust to the memory of that great man who was his instructor and patron, if we ventured to place him in the same rank with him. But what name in modern times, if that of Cuvier be excepted, can be put in competition with that of John Hunter, for careful and philosophical induction, and for the power of concentrating facts derived from most extensive observations upon every part of the animal kingdom, in illustration and confirmation of his physiological theories? It would be unfair to the memory of Sir Everard Home to subject his merits and his fame to be tried by so severe a test; rather let us ask, when the vast range of his knowledge and investigations is considered, who were his rivals or his superiors among his contemporaries, or amongst his survivors?

Sir James Hall, Bart., the author of several important papers in the Edinburgh Transactions, in illustration and in defence of the Huttonian Theory, and of a very ingenious and speculative book on the Origin of Gothic Architecture, is another considerable name, whose loss we have to deplore.

In considering the present state of geological science, we are too apt to forget the fluctuations of opinions and of theories through which we have passed in order to arrive at our present state of comparative repose. It is little more than twenty years since the partisans of Hutton and of Werner divided between them the geological world, and we rarely hear their names now pronounced; not that their names have passed into oblivion, but that their theories and their speculations have become a portion of the history of the science, and no longer form a part of the debateable materials of which it was, or was not, to be constructed. Sir James Hall, in conjunction with his friend Professor Playfair, was, in the early part of the present century, an ardent vindicator of the opinions of Dr. Hutton; and it was with a view to the removal of some of the more popular and startling objections to his theory, that he undertook, and continued during several years, those memorable experiments upon the effects of compression in modifying the action of heat, which have contributed so greatly to the termination of the controversies which were then agitated with so much warmth and severity. These experiments, most happily conceived, and executed with singular boldness and perseverance, completely proved that the most refractory substances may be made fusible by confining the elasticity of the gaseous parts contained in them. Thus, pounded carbonate of

lime or chalk could be rendered fusible, without calcination, and became, upon cooling, a compact stony mass, and even crystalline, like marble: it thus appeared that the effect of heat, acting under enormous pressures, would not necessarily dissipate the gaseous and evaporable parts of the strata of the earth, but would leave them to form such new combinations or modifications of existence as might be determined by the laws of crystallization or of chemical affinities;—a most important fact, and one apparently so difficult to establish in a form which might bring into action those gigantic forces which present themselves in the great operations of nature, as would have checked the attempts of any man who was not urged onward by the most determined enthusiasm in the defence of a favourite theory.

Sir James Hall's work on the Origin of Gothic Architecture cannot be considered as a serious archæological inquiry, but rather as an agreeable exercise of his fancy. The development however of his theory is singularly ingenious and elegant; it proves him to have possessed no mean talents as an artist, and shows a mind alive to all those beautiful combinations of nature which seem to be rendered fixed and permanent in the naves of our Gothic cathedrals, and in the tracery of our decorated windows.

Sir James Mackintosh was born in Morayshire in Scotland, in 1765; he was the son of an officer, of good family, but of very limited fortune; his first destination was for the profession of medicine, and with this view he took the degree of M.D. at Edinburgh, in 1787. Upon his removal, however, to London, shortly afterwards, he abandoned his medical prospects, and gave himself up entirely to the study of the law, and of moral and political philosophy. In 1789 he went to Leyden, where he studied for some time, and afterwards to Liege, where he was a witness of the memorable struggle between the Prince Bishop and his subjects, as well as of many other ebullitions of popular feelings which preceded and foreboded the French Revolution. It was, probably, the contemplation of scenes like these, as well as the observation of the corruptions and abuses of many of the continental governments of Europe, which made him, like many other ardent young men of that period, an admirer of the principles of that great national movement; and the *Vindiciæ Gallicæ*, a work of great force and eloquence, was the most powerful answer which appeared in that age to Mr. Burke's celebrated Reflections, and gained for him, at once, both at home and abroad, a distinguished reputation. The atrocities, however, which marked the more advanced stages of the French Revolution, his own increasing experience and knowledge of mankind, and still more his frequent intercourse with his illustrious adversary, for whose genius he had always professed a chivalrous admiration, however much he had opposed his views and his reasonings, combined to sober down the fervent enthusiasm of his own youthful speculations and hopes; and the principles which he avowed and vindicated in his celebrated defence of Peltier in 1802, must be considered as those which he adopted as the result of the convictions of his maturer age, and

which he continued to maintain through life. In 1803 he was appointed Recorder of Bombay, where he resided for seven years, and where he secured the affection and admiration both of natives and of foreigners, by the able, impartial, and considerate discharge of his judicial functions. Upon his return from India in 1811, he was elected Member of Parliament for Knaresborough, a place which he continued to represent for the remainder of his life.

Few persons of his own age had read so much as Sir James Mackintosh, or remembered what they had read so well. His conversation was singularly instructive and brilliant, without being overbearing; his manners were conciliating, his temper excellent, and he was entirely tolerant of opinions which were different from his own. He was one of the most distinguished Members of the House of Commons; and his speeches upon all the great questions which were agitated in his time were remarkable, not merely for their eloquence, but the large and comprehensive views of national policy, which were supplied by his almost unrivalled knowledge of history and political philosophy.

Sir James Mackintosh, besides his *Vindiciæ Gallicæ*, was the author of Lectures upon the Laws of Nations; of A Sketch of the History of England; of an incomplete Essay on the Principles and the History of Moral Philosophy; and of many admirable Reviews. It is to be lamented that he should have dissipated his extraordinary powers upon occasional and desultory publications, instead of concentrating them upon some great work, which might have transmitted, undiminished, to posterity the reputation which he enjoyed among his friends and cotemporaries. There were, however, many circumstances which might sufficiently account for his failing to leave behind him a monument for future ages, which would have been worthy of his genius and his learning. He brought home with him from India a shattered constitution, which disqualified him for continued and laborious exertion; he had many Parliamentary as well as official duties to perform; and the pressure of his pecuniary necessities compelled him to seek, too frequently, for the immediate remuneration which was supplied by means of contributions to the perishable periodical literature of the day.

Colonel Mark Wilks went to Bengal in 1783, and served in different military and civil capacities in various parts of India. In the year 1804 he was appointed principal Resident at the Court of Mysore, and in the following year he published a very able Report upon the financial condition, resources, and many other subjects connected with the administration of the government of that country. He was the author of "Historical Sketches of the South of India, in an attempt to trace the History of Mysore to the Extinction of the Mohammedan Dynasty in 1799,"—a work of great learning and authority: he was afterwards appointed Governor of St. Helena, and he died in England in the course of the present year.

Colonel Wilks must be considered as one of those distinguished men who have been formed by the system of our Indian Empire. The possession of great commands, upon which the happiness and

misery of considerable nations are dependent, and the intense feeling of responsibility which is connected with the administration of trusts so important, is well calculated, under all circumstances, to call forth into action the highest powers of the human mind; and particularly so, when they have been previously exercised and fortified, as in our Indian service, by the severe study of Oriental languages, and by the successive occupation of different offices, with a great diversity of duties: it is to such causes that we are to attribute the frequent union which we observe in this service of the greatest civil and military talents with the most profound acquisitions in Oriental learning; it is to this system that we are indebted for the production of a Duncan and a Monro, an Elphinstone and a Raffles, a Colebrooke and a Malcolm, and a crowd of great men who have done so much honour to our Indian Government.

Alexander Barry, Professor of Chemistry to Guy's Hospital, and the author of a short paper in our Transactions for 1831, "On the Chemical Action of Atmospheric Electricity," fell a victim to the imprudent pursuit of his chemical inquiries. He was making experiments upon some gases in a highly condensed state, when an explosion took place, by the effects of which he was so much injured as to occasion his death shortly afterwards. He was elected a Fellow of this Society in the course of the last year.

John Shaw, Architect, is advantageously known to the public by several works in the Metropolis, particularly the great hall in Christ's Hospital, and the new church of St. Dunstan in Fleet Street: works which are extremely effective, and well adapted to their objects and positions.

Stephen Groombridge, Esq., was the author of two papers in our Transactions for 1810 and 1814, of considerable interest and value, upon the subject of astronomical refractions: his observations were made at his house at Blackheath, with a four-feet transit circle, which has acquired no small degree of celebrity from its being the first instrument, after the Westbury Circle, to which Mr. Troughton applied his method of division, which he has described in our Transactions. Mr. Groombridge made many thousand observations, which have been reduced by order, and published at the expense of, Government,—a circumstance well deserving to be known by all astronomers, as he was an able and faithful observer, and possessed more advantages for making meridian observations than are commonly enjoyed without the walls of a regular observatory.

Sir Richard Hussey Bickerton was a very distinguished naval officer, who was employed in the service of his country for the greatest part of his life, and who was for some time second in command to Lord Nelson in the Mediterranean and elsewhere, and enjoyed his entire confidence and esteem. He was one of the Lords of the Admiralty from 1805 to 1812, a circumstance which brought him into frequent communication with the Royal Society, and led to his election as a Fellow in 1810.

In our list of Foreign Members, we have to record the deaths of Cuvier and of Chaptal in France, of the Baron de Zach in Germany,

and very lately likewise those of Oriani and of Scarpa in Italy; five celebrated names, which have long been intimately associated with the progress of science. The limits of this address must confine me to a very brief and imperfect notice of their merits and their labours.

The Baron Cuvier, the most illustrious naturalist of modern times, was born at Montbelliard in Alsace, in 1769, and died on the 13th of May last, in the 63rd year of his age: it is not necessary for me to detail any of the circumstances of the life of one whose name has been long known and reverenced in every region of the globe which has enjoyed the blessings of European civilization; suffice it to say, that he was honoured and even courted by every Government in France from the period of the Convention to the present day; that he held the most lucrative and distinguished appointments which the wise policy of that great nation has provided for the honourable support of its men of science and literature; that after the death of Laplace he was universally regarded by his countrymen as the most illustrious of their men of science, and as one of the most distinguished of their men of literature; that funeral orations were pronounced over his grave by men of all political parties, however much opposed to him during his life; and mathematicians and naturalists, geologists, historians and poets, all felt themselves impelled to pay this last tribute of homage to the genius of one, who in so many capacities had done so much honour to his country.

M. Cuvier was in every respect a most extraordinary man: his very presence was calculated to command respect, his countenance bearing that impress of a powerful intellect, which all men recognise when seen, however difficult it may be to define its character: his manners were dignified and polished, and his conversation possessed that happy ease and subdued gaiety which characterized the best age of French society. He was well acquainted with ancient literature, and familiar with the principal languages of modern Europe. His memory was singularly accurate and retentive; and his knowledge of facts, not merely in those sciences which he especially cultivated, but likewise in all other departments of knowledge, and particularly history, was a subject of surprise and admiration to all who knew him. He was also eminently distinguished as a writer of his own language, and his numerous *éloges* delivered in his capacity of *secrétaire perpetuel* to the Institut, of which three volumes have been published, if considered as specimens of composition merely, have equalled, if not surpassed, the best examples of a species of eloquence of which the French nation has just reason to be proud; but if they be considered as specimens of correct and precise discrimination of the merits of the persons commemorated, as determined by their writings and discoveries, and by the influence which they have exercised upon the progress of knowledge, they may justly be pronounced to be unrivalled. It was to this publication that he was indebted for his place amongst the *forty* of the *Académie Française*, an honour which he alone, in his own age, enjoyed in conjunction with his place in the *Académie des Sciences*.

It is, however, chiefly as a naturalist that Cuvier must be viewed, when we seek to determine his permanent rank amongst the few great men who have effected great revolutions in the sciences which they have cultivated, or have left ineffaceable traces of the influence of their discoveries behind them. The whole animal kingdom, from the most obscure indications of the separation between inanimate and animate existence to the mighty monsters of a former world, has assumed under his hands a systematic arrangement, not founded upon superficial and unimportant external characters merely, but upon a most careful and laborious observation of the analogies of internal structure. By tracing every organ successively through the whole series of animals; by carefully determining the functions of such organs and their relations to each other; and by considering them in every animal in the first place as an individual, and in the second place with reference to others, he has been enabled to distribute them into species and genera, and families and classes, where every successive step in their arrangement is the result of a legitimate and inductive generalization. It is by such means that he has been enabled to convert the science of natural history, at least in the animal kingdom, from being little more than a systematic classification, formed for the purpose of identifying genera and species and with no higher view, into a science of strict and severe induction, founded upon a careful observation and comparison of every fact which anatomical and physiological science can detect, and thus to confer upon it a dignity which is only inferior to that of the physical sciences.

It has resulted also, from his researches, that every animal considered as one of the same genus or species, is not only an individual considered as a whole, but also when considered in all its parts; in other words, that every bone, every muscle, every organ, and every part of its structure is *essentially* distinguished from the corresponding parts of an individual of any other genus or species. To a perfect naturalist, therefore, the inspection of a bone, or any other part of an animal, would bring to his mind the entire animal itself, and would identify it as perfectly as if it was exhibited entire to his eye: this would be a triumph of science to which our limited knowledge and faculties can never completely attain; but it was to this point that Cuvier approximated, when he reconstructed as it were the fossil animals of an antediluvian world from the imperfect fragments which remained of them; when he showed in what such animals must have differed, and in what they must have agreed, whether in magnitude or in kind, from the animals which exist at present; when he ventured in fact to define their habits, and to write as it were the natural history of a former world, by throwing upon its obscure and half-obliterated records the powerful light of science and philosophy. The *Histoire des Ossemens fossiles* must ever remain a classical work to geologists; and the discoveries which it contains, and those to which it has led in the hands of others, are some of the most interesting and extraordinary with respect to the past ages of the world, which ob-

servations upon the surface of the globe have ever enabled us to ascertain.

The last great work upon which he was engaged was the *Histoire Naturelle des Poissons*, a prodigious undertaking, of which eight volumes have been published, and which he expected to extend to twenty-five: it was undertaken in conjunction with Messrs. Valenciennes and Laurillard, to whom also he has bequeathed the task of completing it. It will contain the description of 6000 species of fish, 4000 of which had not been noticed in any other work.

Jean Antoine Chaptal, Comte de Chanteloup, was born in 1756, and died in April last in the 76th year of his age. He was Professor of Chemistry at Montpelier before the Revolution, and was one of the most active cultivators of chemical science before that event, in conjunction with Monge, Fourcroy, Berthollet, Guyton de Morveau, and the illustrious Lavoisier. In the year 1793, upon the threatened invasion of France by the Allies, when saltpetre was not to be procured in sufficient quantities for the manufacture of the powder wanted by the French armies, he was invited by the Committee of Public Safety to superintend the establishments for that purpose; and his chemical knowledge so greatly improved the method followed in its manufacture, as in a very short time to make the produce greatly exceed the demand. He was made *Ministre de l'Intérieur* by Napoleon, and continued under the Empire to fill many important situations. He was the author of considerable works on chemistry, on the application of chemistry to the arts, on the application of chemistry to agriculture, on the art of making wines, and on the art of dyeing cotton and wool, which are written in a very perspicuous and elegant style, and which have enjoyed a very considerable popularity in France. The labours of his whole life, in fact, were devoted to the improvement of those manufactures whose perfection depended more or less upon the most correct and economical application of chemical principles; and, after his distinguished countryman Berthollet, he must be placed in the first rank of those who have benefited the arts through the medium of chemical science.

François Xavier Baron de Zach was born at Pesth, in Hungary, in 1754. His taste for astronomy was decided at the early age of fifteen, by the interest which he took in the observation of the comet of 1769, and by the transit of Venus over the disc of the sun in the same year, a memorable event which served to make more than one important convert to the science of astronomy. After travelling with scientific views through different countries of Europe, and residing for several years in England, where he acquired for our manners and institutions an attachment which continued throughout his life, he settled at Gotha, in 1786, in the family of the Duke of Saxe Gotha, who charged him with the construction of the Observatory at Seeberg, over which he continued to preside for a considerable period. He published at Gotha, in 1792, Tables of the Sun, with a Catalogue of 381 Stars, and he subsequently published many other

important astronomical Tables, particularly those on Aberration and Nutation. He became in 1800 the editor of the "Monatliche Correspondentz," a German periodical work on astronomy and geography, which was subsequently published in French under the title of "Correspondance Astronomique &c.," upon his removal to the South of France in 1813, and subsequently to Genoa in company with the Duchesse de Saxe Gotha. This was a most valuable Journal, containing records of the progress of astronomy in every country in Europe, and contributing more than any other publication to the great impulse which has been given for many years to the cultivation of astronomical science in Germany. In 1814 he published his very interesting work on the "Attraction of Mountains." For many of the later years of his life he suffered severely from the stone, and he had established himself at Paris for the purpose of being constantly under the care of Dr. Civiale and experiencing relief by the operation of lithotrity, where he died from a sudden attack of cholera in September last. The Baron de Zach was a most zealous friend to astronomy, and throughout his long life contributed to its progress by his numerous publications, and by maintaining a most extensive and laborious correspondence with the principal astronomers in Europe. He was a man of warm and ardent affections, rapid and sometimes hasty in his conclusions, of the most lively and agreeable manners, and of the most indefatigable industry: and there are few persons of the present day whose loss will be more sensibly felt by the friends of astronomical science in every country in Europe.

Barnaba Oriani, Director of the Observatory of the Brera at Milan, where he has resided for fifty-five years as assistant and principal, was born at Garegnano near Milan, in 1753. He was the principal conductor of the measurement of an arc of the meridian in Italy, and of the great trigonometrical survey of Lombardy, which took place between the years 1786 and 1790; and throughout the course of a long life, he devoted himself to the cultivation of physical and practical astronomy. He was the first person who calculated the orbit of the planet Ceres after its discovery by Piazzi at Palermo. He published theories of the planets Uranus and Mercury, with Tables of their motions. He laboured with singular skill and perseverance in the improvement of the lunar Tables both by theory and observation. He was the author of an admirable treatise on spheroidical trigonometry: and the Astronomical Ephemeris of Milan was published for many years under his directions, by Carlini. Upon the whole, if the union of practical with theoretical science be considered, we shall be justified in pronouncing him to have been, after Bessel, the most accomplished astronomer of the present age.

Antonio Scarpa, one of the eight Foreign Members of the *Académie des Sciences* of Paris, and probably the most profound anatomist of the present age, was born in the year 1746, and died in October last in his eighty-seventh year. He was made Professor

of Anatomy at Pavia in the twenty-second year of his age, and for the last half-century he has been placed by the common consent of his countrymen at the head of their anatomists and surgeons. He was the author of magnificent and classical works on "The Organs of Hearing and Smell," "On the Nerves," "On the principal Diseases of the Eye," "On Aneurism," "On Hernia," with Memoirs on many other subjects of physiology and practical surgery. He had accumulated a handsome fortune by the practice of his profession, and had collected in his palace at Pavia a considerable number of works of art, where he lived for the latter years of his life, surrounded by his pupils, reverenced by his countrymen, and in the enjoyment and contemplation of that brilliant reputation, the full development of which a great man can rarely live to witness.

In thus directing your attention, Gentlemen, to those distinguished Members of the Royal Society, who, unhappily for the interests of science, have been taken from us during the last year, there is one name remaining which I cannot notice without feelings of the most painful embarrassment. To what class shall I, or can I refer it; to the living or to the dead? Though my fears tend too strongly to make me decide upon the choice of the latter, yet I would fain indulge in the hope which is still afforded by the uncertainty, mournful though it be, which hangs over the fate of the gallant and adventurous Captain Ross. The object of his voyage, as is well known to you, was the solution of a nautical problem of the greatest interest and difficulty,—the discovery of a north-west passage. It is a problem which more than any other excited and baffled the adventurous spirit of our most daring seamen of the age of Elizabeth; and when subsequently resumed, chiefly upon the authority of the ingenious speculations of Daines Barrington, a distinguished Member of this Society, and of others of later date, the first attempt of Captain Ross himself and the memorable voyage of Parry, as well as the journey of Franklin, have shown how visionary were all hopes of its successful solution for the purposes of commerce, however interesting it might be for those of science. It was the failure of the first voyage of Captain Ross, and the apparent censure which he conceived rested upon him, in consequence of the greater success of the attempt of his immediate successor in this enterprise, which oppressed his high and manly spirit, and made him seek, with the greatest possible earnestness, for an opportunity of vindicating his professional character. With the assistance of some of his friends he planned another voyage, and nearly three years ago he proceeded to put it into execution. It is to dispel the mystery attendant upon that voyage, of which no tidings have been yet received, and to relieve the misery under which the friends and relations of Captain Ross and his gallant crew are lingering, that a vessel is now preparing, under the command of an able and experienced officer, to pursue the track which he probably followed. I have consented, at the request of the Royal Geographical Society, to be placed at the head of the Committee which has been formed for the aid and

furtherance of this benevolent plan, and I confidently hope that the funds which are necessary to complete this undertaking will not be found wanting.

The name of nearly every distinguished foreigner who has been lost to science during the last year has appeared upon the Foreign List of the Royal Society, and I cannot help considering it as a circumstance which does honour to the Royal Society, that it should thus have associated with it whoever is most eminent in the great aristocracy of European science. It is my wish, Gentlemen, and I feel assured that it is yours also, that the Royal Society should embrace the name of every distinguished man of science in the British dominions. At the last Anniversary it was my pleasing duty to present the Copley Medal to Professor Airy,—a name which would do honour to any Society, but which does not yet appear in the list of our Members: and I lament that I am not allowed to commemorate the name of that very distinguished philosopher, Sir John Leslie, upon this occasion in the obituary of the Royal Society. I look forward with hope, Gentlemen, to the time when the Royal Society shall be so circumstanced as to be free from such a reproach, or rather from such a misfortune.

Report of the Council to the Anniversary Meeting on St. Andrew's Day, 1832.

The Council of the Royal Society have, during the past year, used their most earnest endeavours to render the Library as effective for the purposes of science, as the means at their disposal would enable them. They have been desirous, in particular, to make it as complete as possible in all those departments of science, which it is more especially the object of the Royal Society to cultivate and to advance. They have accordingly purchased, with the advice of the Library Committee, such books as were more immediately required for these purposes, at an expense of about £1600. It was evident, however, that the mere possession of these books by the Society would be of little avail to those who wished to use them, until they were arranged and catalogued according to some uniform and well-digested method. A Committee was therefore appointed to consider of the best plan of effecting this desirable object; and to suggest measures for obtaining a correct catalogue of the library, arranged under such specific heads as were best calculated to assist the inquiries of all those who might resort to it for information. Various plans for this purpose were proposed and discussed: and it was finally determined that in order to insure uniformity of execution, the whole labour of compiling the new classed Catalogue, and of conducting it through the press, should be confided, though still under the superintendence of the Committee, to one person only; provided a proper person could be found who was fully competent to so arduous a task, and also willing to undertake it. The Council have accordingly engaged Mr. Panizzi, of the British Museum, a gentleman of great literary attainments, and conversant with that kind of labour, to undertake